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posed? The physico-chemical method of investigation shown here easily leads to a correct analysis of the action; as a matter of fact, we find silver nitrate a far more powerful oxidizing agent than is ammoniacal silver oxide, and it is so because in both cases the oxidation is due to the tendency of the silver ions to discharge their positive electricity and that positive electricity is the real oxidizing agent here just as it is at the positive pole in every case where a current is passed through any solution whatever. In the silver-nitrate solution there is a far greater concentration of these discharging silver ions than in the ammoniacal solution, in which most of the silver is present in the rather stable complex ion, $[Ag(NH_3)_2]$. But the alkali is used to increase the concentration of the active reducing component of the aldehyde—which probably is a methylene salt $\pm$ CH(ONa) or its ion[3]—the alkali added to the silver nitrate is positively detrimental to the latter's oxidizing power. (Illustrated by an experiment with silver nitrate against formaldehyde and sodium nitrate; then alkali is added to the aldehyde, and finally ammonia to the silver nitrate.) It could be shown in the same way that the alkali used with Fehling's solution in the oxidation of glucose is used wholly for its action on glucose, and is rather a disadvantage than helpful as far as the copper is concerned. This method of investigation enables us, therefore, to analyze the action of our oxidizing and reducing agents, and it promises to lead us ultimately to a mathematical solution of the problem.

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[3] The oxidation of an aldehyde is best interpreted as being due to the oxidation of sodium oxymethylene (NaO)CH $\pm$, the two free valences of which may justly be considered to consist of a positive and a negative electric charge. Any oxidizing agent, *e. g.*, the positive current of electricity resulting from the discharge of the silver ions, would oxidize this as follows:

$$(NaOCH) \pm \text{ and 2 positive charges} \rightarrow (NaO)CH \ddagger$$

and the hydroxyl ions of the alkaline solution would by uniting with this residue give sodium formate:

$$(NaO)HC \ddagger + 2\overline{OH} \rightarrow NaO(HCO) + H_2O.$$

The two sodium ions belonging to the two hydroxyl ions used migrate to the silver nitrate cell in the chemometer, replacing the two silver ions which have been discharged—all of which corresponds to actual observation. (Views developed by Nef, W. A. Noyes and others are in part applied in this interpretation.)

SCIENTIFIC BOOKS

Psychology: General Introduction, pp. 389. *Laboratory Manual of Psychology,* pp. 127. *Laboratory Equipment for Psychological Experiments,* pp. 257. By CHARLES HUBBARD JUDD, Professor of Psychology at Yale University. New York, Charles Scribner's Sons. 1907.

Professor Judd's contribution to the available facilities for the teaching of psychology is a notable one. The plan is consistent, the execution capable, the result distinctive. The text becomes part one of the series of three volumes; a brief laboratory manual makes possible the performance of a considerable range of demonstrations and individual experiments, all reduced to as simple a material basis as is compatible with convenience; while the third volume furnishes the instructor with a *vade mecum* for management and equipment of his modest instrumental plant. The general plan thus provides for the "object lesson" conduct of an introductory course in psychology, suitable at once to colleges and universities and to normal schools that are ready to give psychology a prominent place in their schedules. The text becomes available alike with such illustrative experimentation and without it, or with such portion of it as meager facilities make possible.

In distinction from the more conventional text which implies and as a rule receives the supplementary exposition of demonstration,

there have appeared at least four distinctive procedures for the rendering of first aid to the psychology inquisitive. Professor Sanford's volume was early in the field and adopted the orthodox laboratory-manual method of furnishing a large range of small experiments, each for the most part devoted to the illustration of a principle or minor factor in a carefully presented and elaborated scheme. Professor Titchener's apparatus is the most elaborate and the most advanced. He introduced the twofold division of a manual for the student and another for the instructor, and again divided the procedures into the qualitative and the quantitative type. Four sturdy volumes thus compose the basis for a course in experimental psychology. Moreover, the principle of the Titchener series is to select relatively few problems in the several fields and give to each a thorough and painstaking treatment, sufficient in many cases to yield a definite result in quantitative form. What is thus gained is a considerable training in the research methods of psychology—the procedures by which the standard results have been reached—or at least a worthy prolegomena thereto; what is sacrificed is the demonstration of a large range of phenomena almost equally important and certainly equally valid as illustrations of psychological principles with which the psychologist, amateur or professional, will have to deal. A third type of manual is that by Professor Witmer, which though a single volume of text, yet carries with it an experimental flavor by including a collection of all manner of devices by which paper and print may serve the experimentalist's purposes, and by an insistent use of questions and set exercises which the student may (if sufficiently urged) carry on to his own benefit. The fourth member is that now added by Professor Judd.

There is much to be said for each of these procedures; and the variety of pedagogical principles and practical experiences will determine the preference or expediency of each. Professor Sanford's idea was in the main that of letting each instructor choose his own text (or furnish it by lectures) and find in the manual a large enough range of illustrative material so that by choosing, omitting, intruding and transposing, he may build up an experimental course. Such a plan is of permanent value, is more nearly that which has found favor in other laboratory sciences and will always be preferred by a considerable proportion of the teaching psychologists. It is greatly to be regretted that Professor Sanford has not completed his scheme by writing the second part of his manual, which at this stage (with a revision of the first part) would serve the purposes of quite a number of courses now given in colleges. The great emphasis on illustrations of principles, the covering of a large range of observations, the furtherance of direct speaking relations between the student and the common mass of psychological data: these are the points that commend such a method, as well as the adaptability of the course to the perspective or even the prejudices of the instructor. Professor Titchener's plan, equally distinctive, equally legitimate as an ideal, and more suitable to the graduate student, yet inevitably is limited to a smaller and more professionally interested clientele. The work is authoritative in its own field and indispensable to any one engaged in the experimental enlightenment of students. Yet the attitude and the interest fostered by the Titchener volumes will fail to appeal to a considerable number of worthy students, whose ambition to become familiar with the spirit of the experimental inquiry in psychology deserves recognition. Professor Witmer's volume has the largest popular appeal; it aims to satisfy a less persistent type of interest and does so with skill and success; it is wholly free from the unfortunate type of popularization characterizing Professor Scripture's volume (in construction a very able book), while yet it pretends to be nothing other than what it is. It may be characterized without disparagement as a good summer-school course in psychology. Professor Judd's series occupies the middle ground in the group. It forms a system of text and experimentation, though with a possible independent use of each; like the Titchener series, it gives practical laboratory

guidance to the instructor; like that, too, though not for like reasons, it limits its practical exercises to a rather few problems; yet it shares with Sanford the emphasis of principles and takes for granted about the same level of maturity and earnestness of interest as does the use of the Sanford volume. Yet Judd's book is compatible with the very minimum of hours devoted to practise work, and in that emulates the Witmer volume. It thus becomes clear that the Judd series should find a place amid the sorts and conditions that affect the instruction in psychology in our colleges, and with a favorable environment and able handling, the volumes will do good service. They will also serve the cause of psychology by making available and thus comprehensible to a larger body the close relation of views on life and mind and the scientific attitude towards their examination.

Without risking further so much of the odium of comparison as seemed necessary to place Professor Judd's volume among its fellows, one may proceed to some account of the text. Professor Judd favors an indirect and objective attack upon the problems of mental experience. An introductory setting forth of psychology, what it aims to do and how it proceeds, a survey of the nervous system in its evolutionary phases, a more minute survey of the nervous system of man and of its action, precede the general unfoldment of conscious experience from which the rest of the volume takes its order and unfoldment. For the systematic groupings and analyses of mental experience prove to be those connected with sensations and their functional issue in relations to the outer world with its setting in space and time, and then most naturally the culmination and motivation of these in the expression of action and behavior. The conduct thus resulting presents gradations and complications, and in turn involves subjective attitudes and analyses of various degrees of complexity. Instinct, memory, imagination, the self feelings, impulse and choice, further engage the psychologist's attention, while two concluding chapters, the one upon dissociation and the other upon applications of psychology, widen the outlook to include certain corners of the abnormal field and the embodiment of psychological results in educational practise.

Every one having to do with texts in his teaching specialty comes to regard a new applicant for favor under apperceptive criteria of his own. The present writer considers first the content, the material presented, the perspective of topics and the enlightenment available: what kind of a table has the psychological caterer set? He considers next—though really concomitantly—the spirit of the presentation, the tone, the attitude of the craftsman. This is more than the palatability of the viands; it involves the underlying chemistry of food preparation, the esthetics of the art culinary and a knowledge of appetites and their vagaries and shortcomings. He asks thirdly how will the student react when the feast is spread before him, remembering that the diet is to be adhered to for a semester or longer. The notable success of Professor Judd's text is in the first respect. It sets a substantial and admirably selected diet. The emphasis upon the genetic side of things is real and instructive, not forced, superficial and distorted, as appears in so many attempts in "psychology for teachers." The contact with realities of experience is close; and the student should feel the realism of his study. Again the tone is thoroughly psychological; while thoroughly sympathetic with physiological results, it insists upon psychological interpretations. It equally avoids undue absorption in controversial issues and philosophical speculations. On the second count, except as already involved, commendation must give way to criticism. The author fails to bear in mind that he is teaching, presenting, expounding, not justifying the details of his presentation, or disclosing how he or his brother psychologists have come to hold as they do. This fault of Professor Judd's pages both unduly expands and detracts from their merit, and such digressions are an obstacle to the student and wholly foreign to the underlying purpose of the text. It is an error of judgment rarely found in a text-book in physics, but seems to be a temptation for the majority of writers

of "psychologies." Equally must it be pointed out that the forest does not appear very plainly or very attractively among the trees. There is a little too much detail, a little too little contouring of the larger topography. The map is serviceable, but not illuminating. On the third count the writer must frankly express his doubts. The genus student is a difficult guest and his reactions uncertain. Doubtless he likes not that which is good for him, and partakes in large quantities of what is pernicious. Yet, after all, he has a rather versatile appetite which responds to judicious encouragement. Plainly, the diet must be made attractive. Professor Judd's book is not emphatically unattractive from the student's point of view; yet in this respect, it does not compare in success of achievement with several of its rivals for collegiate favor—notably with Professor Angell's text.

Writing texts is like much else, a matter of temperament. The good text-writer is largely born and not made—at least not by the publisher's solicitation. Nor have the best teachers always proved themselves the best writers of texts. The conditions are not unlike those attaching to the construction of ocean steamships, requiring one model for speed and another for cargo. Each result is a compromise; though some are plainly freighters; and others lightly burdened greyhounds. Solidity of content and attractiveness of exposition are not incompatible; but when they are found in marked degree, the possessor thereof should feel within him the call to write a text. In the meantime we shall be content with what there is, and welcome Professor Judd's volumes to a place among their fellows.

Joseph Jastrow

Scientific Journals and Articles

The American Naturalist for February has an article on "The Law of Geminate Species," by David Starr Jordan, geminate species, being two closely related species, found on opposite sides of some natural barrier. Henri Hus discusses "Fasciations of Known Causation," noting that these abnormalities may be transmitted by seeds or cuttings. Charles A. White treats of "The Aggregate Origination of Parasitic Plants" and Charles Depéret of "The Evolution of the Tertiary Mammals and the Importance of their Migrations," considering the changes in the fauna of certain European beds as brought about by local evolution and by immigrations from North America and other regions. G. H. Parker considers "Zoological Progress" or the increase in our knowledge of the animal kingdom. Under "Notes and Literature" variation in *Amblystoma tigrinum* finds itself under *In*vertebrate Morphology.

Bird-Lore for March–April has articles on "The Home Life of the American Egret," by Frank M. Chapman; "The Background of Ornithology," by Spencer Trotter; "The Nest in the Gutter," by Gilbert H. Trafton, and the third paper on "The Migration of Flycatchers," by W. W. Cooke. Under "The Common Names of North American Birds" Edward H. Perkins proposes changes in some inapplicable names. The Audubon leaflet is by Mabel Osgood Wright and is devoted to the song sparrow. A new bird reservation in Florida, known as the Mosquito Inlet Reservation, is announced.

The Zoological Society Bulletin for April is an "Aquarium Number" and deals with all manner of aquatic animals. There are articles on "The Natural Foods of Freshwater Fishes," "Porpoises, Long-lived Fishes"—some of which have lived in the Aquarium for fourteen years—"The Sturgeons, Electrical Fishes and Luminous Fishes." "The Largest Marine Animals" gives much information on the size and weight of many species and "A Large Lobster" records a specimen twenty-three and three quarter inches from tail to rostrum and weighing thirty-four pounds. It is announced that an effort will be made to capture some porpoises by means of a heavy seine and bring them alive to the aquarium.

Societies and Academies

The Boston Society of Medical Sciences Comparative Anatomy at the Harvard Medical School

A special meeting of the Boston Society of Medical Sciences, devoted entirely to the cur-